

Does Net-Based Education Help Students?: Usage of New Resources.

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Introduction. Medical schools around the world are rushing to include network-based electronic learning resources in their arsenal of teaching aids. One reason frequently cited for this move is increased access to materials through decentralization. Yet little is known about whether such increased access is in fact realized. Since the movement to new technology almost invariably involves great expense as well as great commitment of people and other resources, an inquiry into the effectiveness of such a move is clearly in order.

One such resource, University of Maryland Promedtheus, substantially duplicates a set of histology kodachromes with text annotations which is available in the university Learning Resource Center (LRC). The images for Promedtheus were scanned from the slide carousels -- they are identical, as are the text annotations.

Methods. Although server access logs present serious problem for reliable data analysis, we were able to carefully select valid information from our voluminous logs using a series of custom Perl scripts and the access log analysis program Analog. We isolated and quantified requests for files within Promedtheus. In order to as truly as possible count educational accesses, we counted only requests for JPEG-encoded images, since that is the format of the actual histology images in the Promedtheus directories. Finally, we selected information about only the JPEGs in the actual image directories, since reduced-size picture icons are also encoded as JPEGs within the Promedtheus file hierarchy. Ultimately we produced a summary of Promedtheus image accesses by month, by day, and by hour. We were also able to obtain data differentiating on and off campus accesses.

Results. Students made substantial use of Promedtheus. From September 20th 1996, when logging began, through mid-March 1997 student machines requested a total of 27 Mb of images from within Promedtheus. Not surprisingly, the most active use was during the period that histology (taught as part of a multidisciplinary Structure and Development course) was actively taught -- the mean image transfer rate during the course was 878.3 images/week, a 370% increase over the mean rate for

the period sampled ($p < .01$). Usage was particularly high before the Structure and Development final exam on the 25th of October: 1118 images were served that week, 4 times the overall mean ($p < .01$).

Use of Promedtheus also escalated on the weekends, when the LRC's hours are substantially cut back (usually 12 - 5 vs. 9 - 8, with some variability). The mean image transfer rate was 38.5 images/hour. The mean weekend image transfer rate was 53.9 images/hour, an increase of 40% ($p < .01$).

Off campus vs. on campus access is another good indicator of the effective use of Promedtheus. Off campus students requested 698.8 image/hr vs. 94.2 image/hr requested by on-campus students. Off campus use peaked during the evening and night hours, but there was substantial off campus use during the midday.

Discussion. In the case of Promedtheus, it seems clear that students availed themselves of the new resource and used it in a way that extended the previously available materials. Students used the program substantially during the time that they were learning histology and they would have been using the Kodachromes. Students appear to have used the program not as a substitute, but an alternative to the traditional modality. That use decreased when the LRC was closed probably reflects student downtime. However, students did use the program heavily when the Kodachromes were not available, and more importantly, they used the program in ways that would have been impossible with Kodachromes -- from home, late at night. Promedtheus is clearly a success as a 24 hour, 7 day a week slide browser.

Conclusion. Promedtheus, a web-based histology image browser, is a successful addition to the curriculum. If careful attention is paid to student needs, networked education applications may substantially increase student access to essential curriculum resources.

Acknowledgements. The authors wish to thank for their advice and assistance Steve Barkley, M.A., Miriam Jaffe, Phillip Shacklock, Ph. D., and Kathy Zhang.